CLAIMS OF THE INVENTION

We claim:

1. A method for two-dimensional or three-dimensional spatial manipulation or two-dimensional or three-dimensional entertainment, comprising:

generating one or more interface devices to alter and generate one or more two-dimensional or three-dimensional virtual objects, wherein said devices can control N degrees of freedom of said virtual objects;

associating said interface devices in conjunction with each other to alter one or more two-dimensional or three-dimensional virtual components;

providing one or more three-dimensional virtual tools to a user for said spatial manipulation or said two-dimensional or said three-dimensional entertainment; and

providing a plurality of video game controllers to said user for said spatial manipulation or said two-dimensional or said three-dimensional entertainment.

2. The method of claim 1 wherein said interface devices are digital input devices.

3. The method of claim 1 wherein said interface devices are physical input devices.

4. The method of claim 1 wherein said virtual components are a software representation of one or more physical input devices, wherein said software representation has a two-dimensional or three-dimensional rendering associated with it.

5. The method of claim 1 wherein one of said virtual components is a two-dimensional GUI.

6. The method of claim 1 wherein one of said virtual component is a three-dimensional GUI.

7. The method of claim 1 wherein one of said virtual components is a cursor on a computer screen.

8. The method of claim 1 wherein one of said interface devices is a grabbing tool.

9. The method of claim 8 wherein said grabbing tool has a physical form resembling a pair of kitchen tongs.

10. The method of claim 8 wherein said grabbing tool has a physical form resembling a pair of pincers.

11. The method of claim 8 wherein said grabbing tool has a physical form resembling a pair of scissors.

12. The method of claim 8 wherein said grabbing tool has a physical form resembling a pair of tweezers.

13. The method of claim 8 wherein a first virtual form of said grabbing tool is an iconic virtual component only.

14. The method of claim 8 wherein a second virtual form of said grabbing tool is a first iconic virtual component coupled with a second virtual component that coincides with said tool's physical form.

15. The method of claim 8 wherein a third virtual form of said grabbing tool is a virtual component coinciding with said tool's physical form.

16. The method of claim 8 wherein a fourth virtual form of said grabbing tool is a lack of virtual depiction.

17. The method of claim 8 further comprises:

altering the relationship between said grabbing tool and its corresponding three-dimensional virtual component;

mapping said grabbing tool to said corresponding virtual component;

controlling position of said corresponding virtual component to one of said virtual objects; and

generating an iconic form when said corresponding virtual component is close enough to react with one of said virtual objects.

18. The method of claim 17 wherein said controlling comprises embedding one or more sensors within said virtual component.

19. The method of claim 18 wherein said sensors is any one of magnetic, optical, or inertial sensors.

20. The method of claim 17 wherein said controlling position comprises integrating said virtual component within a controlling environment.

21. The method of claim 20 wherein said controlling environment is a camera.

22. The method of claim 8 wherein said grabbing tool has a plurality of controls to activate one or more functions.

23. The method of claim 22 wherein said plurality of controls comprises buttons, joysticks, scroll wheels, or foot pedals embedded in said virtual component.

24. The method of claim 22 wherein one of said functions is to display to said user a virtual menu consisting of one or more choices for said user to choose from.

25. The method of claim 22 wherein one of said functions is to toggle between a first action mode and a second action mode.

26. The method of claim 25 wherein said first action mode is a default action mode.

27. The method of claim 22 wherein one of said functions is to release a plurality of virtual weapons of one or more type.

28. The method of claim 1 wherein one of said interface devices is a pointing tool.

29. The method of claim 28 wherein said pointing tool has a physical form resembling a firearm.

30. The method of claim 29 wherein said firearm is a gun.

31. The method of claim 28 wherein said pointing tool has a physical form resembling a laser pointer.

32. The method of claim 28 wherein said pointing tool has a physical form resembling a camera.

33. The method of claim 28 wherein said pointing tool has a physical form resembling a pointing hand.

34. The method of claim 28 wherein said pointing tool has a physical form resembling a stick.

35. The method of claim 28 wherein said pointing tool has a physical form resembling a flashlight.

36. The method of claim 28 wherein said pointing tool has a physical form resembling a spray-paint can.

37. The method of claim 28 wherein said pointing tool has a physical form resembling a glue-gun.

38. The method of claim 28 wherein a first virtual form of said pointing tool is an iconic virtual component only.

39. The method of claim 28 wherein a second virtual form of said pointing tool is a first iconic virtual component coupled to a second virtual component that coincides with said tool's physical form.

40. The method of claim 28 wherein a third virtual form of said pointing tool is a virtual component coinciding with said tool's physical form.

41. The method of claim 28 wherein a fourth virtual form of said pointing tool is a lack of virtual depiction.

42. The method of claim 28 further comprises:

altering the relationship between said pointing tool and its corresponding three-dimensional virtual component;

mapping said pointing tool to said corresponding virtual component;

controlling position of said corresponding virtual component to one of said virtual objects; and

generating an iconic form when said corresponding virtual component is close enough to react with one of said virtual objects.

43. The method of claim 42 wherein said controlling comprises embedding one or more sensors within said virtual component.

44. The method of claim 43 wherein said sensors is any one of magnetic, optical, or inertial sensors.

45. The method of claim 42 wherein said controlling position comprises integrating said virtual component within a controlling environment.

46. The method of claim 45 wherein said controlling environment is a camera.

47. The method of claim 28 wherein said pointing tool has a plurality of controls to activate one or more functions.

48. The method of claim 47 wherein said plurality of controls comprises buttons, joysticks, scroll wheels, or foot pedals embedded in said virtual component.

49. The method of claim 47 wherein one of said functions is to display to said user a virtual menu consisting of one or more choices for said user to choose from.

50. The method of claim 47 wherein one of said functions is to toggle between a first action mode and a second action mode.

51. The method of claim 50 wherein said first action mode is a default action mode.

52. The method of claim 47 wherein one of said functions is to release a plurality of virtual weapons of one or more type.

53. The method of claim 1 wherein one of said interface devices is a gripping tool.

54. The method of claim 53 wherein said gripping tool has a physical form resembling a handle.

55. The method of claim 54 wherein said handle is a sword handle.

56. The method of claim 54 wherein said handle is a shovel handle.

57. The method of claim 53 wherein a first function of said gripping tool is to place said virtual objects in a three-dimensional space.

58. The method of claim 53 wherein a second function of said gripping tool is to draw one or more paths between two or more of said virtual objects.

59. The method of claim 53 wherein a first virtual form of said gripping tool is an iconic virtual component only.

60. The method of claim 53 wherein a second virtual form of said gripping tool is a first iconic virtual component coupled with a second virtual component that coincides with said tool's physical form.

61. The method of claim 53 wherein a third virtual form of said gripping tool is a virtual component coinciding with said tool's physical form.

62. The method of claim 53 wherein a fourth virtual form of said gripping tool is a lack of virtual depiction.

63. The method of claim 53 further comprises:

altering the relationship between said gripping tool and its corresponding three-dimensional virtual component;

mapping said gripping tool to said corresponding virtual component;

controlling position of said corresponding virtual component to one of said virtual objects; and

generating an iconic form when said corresponding virtual component is close enough to react with one of said virtual objects.

64. The method of claim 63 wherein said controlling comprises embedding one or more sensors within said virtual component.

65. The method of claim 64 wherein said sensors is any one of magnetic, optical, or inertial sensors.

66. The method of claim 63 wherein said controlling position comprises integrating said virtual component within a controlling environment.

67. The method of claim 66 wherein said controlling environment is a camera.

68. The method of claim 53 wherein said grabbing tool has a plurality of controls to activate one or more functions.

69. The method of claim 68 wherein said plurality of controls comprises buttons, joysticks, scroll wheels, or foot pedals embedded in said virtual component.

70. The method of claim 68 wherein one of said functions is to display to said user a virtual menu consisting of one or more choices for said user to choose from.

71. The method of claim 68 wherein one of said functions is to toggle between a first action mode and a second action mode.

72. The method of claim 71 wherein said first action mode is a default action mode.

73. The method of claim 68 wherein one of said functions is to release a plurality of virtual weapons of one or more type.

74. A method to draw a virtual object in a two-dimensional or three-dimensional space or in a two-dimensional or three-dimensional entertainment environment, comprising:

using two or more physical input devices coincidentally.

75. The method of claim 74 wherein using two or more physical input devices further comprises:

using said grabbing tool in combination with said pointing tool to create a solid curve or volume.

76. The method of claim 75 wherein said using grabbing tool in combination with said pointing tool further comprises:

using said grabbing tool to grab said pointing tool's virtual object;

bending said virtual object of said pointing tool with said grabbing tool; and

sweeping said pointing tool in said three-dimensional space or entertainment environment to create said curve or volume.

77. The method of claim 76 wherein said sweeping causes a three-dimensional solid curve if said curve is not a closed loop.

78. The method of claim 76 wherein said sweeping causes a three-dimensional solid volume if said curve is a closed loop.

79. A method to assemble and rearrange a virtual molecule in a two-dimensional or three-dimensional space or in a two-dimensional or three-dimensional entertainment environment, comprising:

using said grabbing tool in combination with said gripping tool and said pointing tool.

80. The method of claim 79 wherein said using further comprises:

using one of said gripping tool's plurality of controls to activate one or more of said gripping tool's functions to construct said molecule;

using said pointing tool to draw one or more bonds of said molecule;

using said grabbing tool to move said molecule to a position in said three-dimensional space or entertainment environment for easier drawing of said bonds; and

using said gripping tool to break any one or more of said bonds.

81. A method to change placement of a virtual object in a two-dimensional or three-dimensional space or in a two-dimensional or three-dimensional entertainment environment, comprising:

using two or more of said physical input devices coincidentally.

82. The method of claim 81 wherein said using two or more physical input devices further comprises:

using a first grabbing tool in conjunction with a second grabbing tool to rotate said virtual object in two-dimensional or three-dimensional space or in a three-dimensional entertainment environment.

83. The method of claim 82 wherein said using further comprises:

grabbing a first extremity of said virtual object with said first grabbing tool;

grabbing a second extremity of said virtual object with said second grabbing tool; and

rotating said virtual object to a desired position in said two-dimensional or three-dimensional space or three-dimensional entertainment environment by moving one or both of said first grabbing tool and said second grabbing tool.

84. A method to deform a virtual object in a two-dimensional or three-dimensional space or in a two-dimensional or three-dimensional entertainment environment, comprising:

using two or more of said physical input devices coincidentally.

85. The method of claim 84 wherein said using two or more physical input devices further comprises:

using a first grabbing tool in conjunction with a second grabbing tool to stretch said virtual object in two-dimensional or three-dimensional space or in a three-dimensional entertainment environment.

86. The method of claim 84 wherein said using two or more physical input devices further comprises:

using a first grabbing tool in conjunction with a second grabbing tool to twist said virtual object in two-dimensional or three-dimensional space or in a three-dimensional entertainment environment.

87. A method to alter a physical input device's virtual object in a two-dimensional or three-dimensional space or in a two-dimensional or three-dimensional entertainment environment, comprising:

using two or more of said physical input devices coincidentally.

88. The method of claim 87 wherein said using two or more physical input devices further comprises:

using a first grabbing tool to modify an axis of rotation of a second grabbing tool in two-dimensional or three-dimensional space or in a three-dimensional entertainment environment.

89. The method of claim 88 wherein said using further comprises:

using said first grabbing tool to grab said second grabbing tool's virtual component;

using said first grabbing tool to move said virtual component of said second grabbing tool to a desired location in two-dimensional or three-dimensional space or three-dimensional entertainment environment in relationship to said second grabbing tool; and

using said second grabbing tool to rotate said virtual object once said virtual component is positioned in said desired location.

90. A method to specify a point in a two-dimensional or three-dimensional space or in a two-dimensional or three-dimensional entertainment environment, comprising:

using two or more of said physical input devices coincidentally.

91. The method of claim 90 wherein said using two or more physical input devices further comprises:

using a first pointing tool and a second grabbing tool to specify a point in two-dimensional or three-dimensional space or in a three-dimensional entertainment environment.

92. The method of claim 91 wherein said using further comprises:

intersecting a virtual object of said first pointing tool and a virtual object of said second pointing tool to denote said point in said two-dimensional or three-dimensional space or in a three-dimensional entertainment.

93. The method of claim 92 wherein said virtual object of said first pointing tool and said second pointing tool resembles a laser beam.

94. The method of claim 92 wherein said virtual object of said second pointing tool resembles a plane emanating from a barrel of a gun.

95. A method for altering the spatial relationship between a physical input device and one or more of its two or three-dimensional virtual components, comprising:

using a first physical input device and a second physical input device coincidentally.

96. The method of claim 95 wherein said using a first and a second physical input device further comprises:

using said first physical input device and said second physical input device to cut a virtual object located at a position in said two-dimensional or three-dimensional space or three-dimensional entertainment environment.

97. The method of claim 96 wherein said using further comprises:

using said first physical input device to grab said second physical input device's virtual object;

using said first physical device to lengthen said virtual object until it reaches a desired length; and

using said second physical input device to cut said virtual object.

98. A method to map a plurality of virtual components to one physical input device, comprising:

using a virtual menu to map said plurality of virtual components to said physical input device.

99. The method of claim 98 wherein said virtual menu is activated via an additional control on said physical input device.

100. A method to change a plurality of virtual components mapped to a physical input device, comprising:

using a virtual menu to change said plurality of virtual components mapped to said physical device.

101. The method of claim 100 wherein said virtual menu is activated via an additional control on said physical input device.

102. The method of claim 1 wherein each of said three-dimensional virtual tools has a virtual form further comprising:

an iconic virtual component only;

an iconic virtual component along with a virtual component that resembles said tool's physical form;

a virtual component only that resembles said tool's physical form; and

a virtual component lacking virtual depiction.

103. The method of claim 102 further comprises:

controlling position of three-dimensional virtual component to one of said virtual objects.

104. The method of claim 103 wherein said controlling comprises embedding one or more sensors within said virtual component.

105. The method of claim 104 wherein said sensors is any one of magnetic, optical, or inertial sensors.

106. The method of claim 104 wherein said sensors can activate one or more functions.

107. The method of claim 106 wherein said functions further comprises:

monitoring when said virtual tool is moved from a default location; and

monitoring when said virtual tool is being held by said user.

108. The method of claim 103 wherein said controlling comprises integrating said virtual component within a controlling environment.

109. The method of claim 108 wherein said controlling environment is a camera.

110. The method of claim 1 wherein one of said three-dimensional virtual tool is an eraser tool, wherein said tool is used to remove a region of a virtual surface.

111. The method of claim 1 wherein one of said three-dimensional virtual tool is a deformation tool, wherein said tool is used to deform the geometry of said virtual component.

112. The method of claim 1 wherein one of said three-dimensional virtual tool is a smoothing tool, wherein said tool is used to smooth a surface of said virtual component.

113. The method of claim 1 wherein one of said three-dimensional virtual tool is a spray-painting tool, wherein said tool is used to spray said virtual component with virtual paint.

114. The method of claim 1 wherein one of said three-dimensional virtual tool is a texture creation tool, wherein said tool is used to spray a texture on said virtual component.

115. The method of claim 110 wherein said eraser tool has a plurality of controls to activate one or more functions.

116. The method of claim 115 wherein said plurality of controls comprises buttons, joysticks, scroll wheels, or foot pedals embedded in said tool.

117. The method of claim 115 wherein one of said functions is to change a size of a default erasing region.

118. The method of claim 115 wherein one of said functions is to display to said user a virtual menu consisting of one or more choices for said user to choose from.

119. The method of claim 115 wherein one of said functions is to toggle between a first action mode and a second action mode.

120. The method of claim 119 wherein said first action mode is a default action mode.

121. The method of claim 111 wherein said deformation tool has a plurality of controls to activate one or more functions.

122. The method of claim 121 wherein said plurality of controls comprises buttons, joysticks, scroll wheels, or foot pedals embedded in said tool.

123. The method of claim 121 wherein one of said functions is to change a sensitivity of deformation of said virtual component.

124. The method of claim 121 wherein one of said functions is to display to said user a virtual menu consisting of one or more choices for said user to choose from.

125. The method of claim 121 wherein one of said functions is to toggle between a first action mode and a second action mode.

126. The method of claim 125 wherein said first action mode is a default action mode.

127. The method of claim 112 wherein said smoothing tool has a plurality of controls to activate one or more functions.

128. The method of claim 127 wherein said plurality of controls comprises buttons, joysticks, scroll wheels, or foot pedals embedded in said tool.

129. The method of claim 127 wherein one of said functions is to change a size of a soothing region of said virtual component.

130. The method of claim 127 wherein one of said functions is to change a degree of smoothing of said virtual component.

131. The method of claim 127 wherein one of said functions is to display to said user a virtual menu consisting of one or more choices for said user to choose from.

132. The method of claim 127 wherein one of said functions is to toggle between a first action mode and a second action mode.

133. The method of claim 132 wherein said first action mode is a default action mode.

134. The method of claim 113 wherein said spray-painting tool has a plurality of controls to activate one or more functions.

135. The method of claim 134 wherein said plurality of controls comprises buttons, joysticks, scroll wheels, or foot pedals embedded in said tool.

136. The method of claim 134 wherein one of said functions is to change a color of a paint sprayed on said virtual component.

137. The method of claim 134 wherein one of said functions is to change a flow rate of said paint being sprayed on said virtual component.

138. The method of claim 134 wherein one of said functions is to display to said user a virtual menu consisting of one or more choices for said user to choose from.

139. The method of claim 134 wherein one of said functions is to toggle between a first action mode and a second action mode.

140. The method of claim 139 wherein said first action mode is a default action mode.

141. The method of claim 114 wherein said texture creation tool has a plurality of controls to activate one or more functions.

142. The method of claim 141 wherein said plurality of controls comprises buttons, joysticks, scroll wheels, or foot pedals embedded in said tool.

143. The method of claim 141 wherein one of said functions is to change a type of texture sprayed on said virtual component.

144. The method of claim 141 wherein one of said functions is to change a flow rate of said texture being sprayed on said virtual component.

145. The method of claim 141 wherein one of said functions is to display to said user a virtual menu consisting of one or more choices for said user to choose from.

146. The method of claim 141 wherein one of said functions is to toggle between a first action mode and a second action mode.

147. The method of claim 146 wherein said first action mode is a default action mode.

148. The method of claim 1 wherein one of said controller is a grabbing controller, wherein said controller is used to grab said one or more virtual objects in said entertainment environment.

149. The method of claim 148 wherein said grabbing controller is used to rotate said one or more virtual objects.

150. The method of claim 148 wherein said grabbing controller is used to move said one or more virtual objects.

151. The method of claim 1 wherein one of said controllers is a slicing controller, wherein said controller is used to slice and relocate said one or more virtual objects in said entertainment environment.

152. The method of claim 151 wherein one of said slicing controller's physical shape is a handle and one of its virtual component is a laser beam.

153. The method of claim 152 wherein said handle shaped slicing controller is used to drop objects in said entertainment environment.

154. The method of claim 1 wherein one of said controllers is a pointing controller, wherein said controller is used to shoot said one or more virtual objects in said entertainment environment.

155. The method of claim 154 wherein said pointing controller is used to select said one or more virtual objects in said entertainment environment.

156. The method of claim 154 wherein said pointing controller is used to grab or rearrange said one or more virtual objects in said entertainment environment.

157. The method of claim 1 wherein one of said controllers is a drawing controller, wherein said controller is used to draw a stroke in said entertainment environment.

158. The method of claim 157 wherein said stroke is drawn freehand by said user in said entertainment environment.

159. The method of claim 157 wherein said stroke is drawn using said handle by said user in said entertainment environment.

160. The method of claim 1 wherein one of said controllers is a navigation controller, wherein said controller is used to navigate said user in said entertainment environment.

161. The method of claim 1 wherein N degrees of freedom is 6 degrees of freedom.

162. The method of claim 1 wherein N degrees of freedom is more than 6 degrees of freedom.